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Dr. P.

New York Agricultural Experiment Station.

PETER COLLIER, DIRECTOR.

BULLETIN No. 28—NEW SERIES.

APRIL, 1891.

PIG FEEDING EXPERIMENTS WITH COARSE FOODS.

RESULTS WITH PRICKLY COMFREY.

OAT-AND-PEA FORAGE AND RED CLOVER.

CLOVER WITH AND WITHOUT SALT.

SORGHUM AND MANGOLDS.

GENEVA, N. Y.

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BULLETIN No. 28—NEW SERIES.

At different times during the year 1890 and the following winter, feeding trials have been made with various coarse foods that are commonly grown on the farms of this state, and many of which are often recommended for swine.

Some of the foods, viz.: sorghum, oat and pea forage, and mangolds were in such demand for the dairy cattle that it was only possible to make short feeding trials with them, but the results secured were enough to indicate that these foods may be economically fed with grain, and perhaps as a substitute for a large part of the ordinary grain ration.

Corn ensilage, prickly comfrey and clover were available for longer periods, but no profit was found in feeding any of these in very large proportions. With ensilage rated at a low figure and pork at a fair price, during the early part of 1890, a ration of which over 40 per cent. was ensilage was more profitable than an entire grain ration. With a larger proportion of ensilage the ration was an unprofitable one. Corn ensilage was fed for five months, and a bulletin was issued last August containing record of the results.

Prickly comfrey has never been eaten in any large amount by pigs here and all attempts to feed it profitably have been unsuccessful. Clover was only fed profitably when it constituted less than 25 per cent. of the water-free food.

Sorghum forage and mangolds gave promising results, and inasmuch as highly nitrogenous grain foods of high fertilizing value, such as linseed meal and cotton-seed meal, can be fed with them, they are worthy of more extended trial. The results obtained in several of the feeding trials are given in this bulletin.

The only pigs used when feeding these coarse foods were Duroc Jerseys and Cheshires. The Duroc Jerseys have always more readily eaten such foods, and as sold by live weight, have given the more profitable returns.

That a small amount of salt is a profitable addition to some rations appears probable, but just how much can be advantageously used is difficult to say, for results are somewhat contradictory.

RESULTS WITH PRICKLY COMFREY.

For a short time in July and August, two pens of pigs (Cheshires) each containing two sows and a barrow, all of the same litter and of about the same weights, Lot A averaging 64.3 lbs., and Lot B 64.6 lbs., were fed all the prickly comfrey they would eat and a little corn meal. The comfrey formed over 90 per cent. of the total food consumed in both pens, and less than 58 per cent. of the water-free food, the moisture being 88 per cent. in the fresh plant.

Neither lot would eat enough to make any gain or even hold their weight. It would hardly seem that it was lack of capacity alone that prevented the consumption of more, for, although while getting clover containing less water the consumption of total food was similar, yet when pigs were fed mangolds which contained as large a portion of water (89 per cent.) the total food consumed for every hundred pounds live weight was more than twice as much. When feeding sorghum also the consumption of total food was more than twice as great as with prickly comfrey.

There was a steady loss in weight with each lot for the period during which prickly comfrey was fed, the average results per day being as follows :

AVERAGE PER DAY FOR EVERY 100 LBS. LIVE WEIGHT.

	Prickly comfrey fed.	Prickly comfrey consumed.	Corn meal.	Total food consumed.	Water.
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
A. June '27 to July 18.....	5.81	5.17	.52	5.69	7.82
B. " " " " " ".....	5.78	5.05	.52	5.57	7.63

	Water- free com- frey con- sumed.	Water- free corn meal.	Total water- free food.	Gain in weight.	Per cent. of total food as grain.	Per cent. of water- free food as grain.
	Lbs.	Lbs.	Lbs.	Lbs.		
A. June 27 to July 18.....	.62	.45	1.07	— .20	9.1	42.1
B. " " " " " ".....	.61	.45	1.06	— .35	9.3	42.4

OAT-AND-PEA FORAGE AND RED CLOVER.

These same lots of pigs were fed, one with oat-and-pea forage and corn meal, and the other with fresh red clover and corn meal. The average composition of each food was :

	Oat-and-pea forage.	Red clover.
Per cent. water.....	48.30	62.70
" " ash.....	3.00	2.43
" " crude albuminoids.....	8.39	4.92
" " " fibre.....	12.36	11.86
" " N.-free extract.....	25.12	16.55
" " fats.....	2.33	1.72

The clover was second growth, and although containing little water, was cut in rotation and averaged just in bloom. The oat-and-pea forage was the same as fed to the cattle, only considerably drier. The clover formed 89.6 per cent. of the total food and the oat and pea forage 89.3 per cent. Of the water-free food the proportion of coarse fodder was 78.4 and 81.9 per cent. respectively. The following average results from feeding were obtained :—

AVERAGE PER DAY FOR EACH 100 LBS. LIVE WEIGHT.

		Total Clover Fed.	Total clover con- sumed.	Total Oat and Pea For- age Fed.	Total Oat and Pea For- age Con- sumed.	Total Corn Meal.	Total Food Con- sumed.	Water.
Lot A.	July 18 to Aug. 8.	Lbs. 6.93	Lbs. 6.05	Lbs. 6.75	Lbs. 5.69	Lbs. .70 .68	Lbs. 6.75 6.37	Lbs. 7.80 7.88
" B.	" "							

		Water- free clover con- sumed.	Water- free oat and pea forage con- sumed.	Water- free corn meal,	Total water- free food.	Gain. in wt.	Water- free food con- sumed. for 1 lb. gain in wt.	Per cent. of total food as grain.	Per cent. of water- free food as grain.
Lot A.	Jul. 18 to Aug. 8	Lbs. 2.25	Lbs. 2.72	Lbs. .62 .60	Lbs. 2.87 3.32	Lbs. +.09 +.45	Lbs. 31.89 7.37	10.4 10.7	21.6 18.1
" B.	" "								

With the oat-and-pea forage rated at the value of \$3.00 per ton the increase in weight would be profitable, but at the prices holding in the fall of 1890 would only be profitable with the forage at about \$2 a ton. The pigs having clover made so small a gain that there would be a loss from the corn meal fed, even if the clover was considered as representing no value.

CLOVER WITH AND WITHOUT SALT.

The same pen (Lot A) was continued on clover for the next 28 days and had salt added to the ration at the rate of one quarter of an ounce per day for every hundred lbs. live weight, and the gain in weight was much better, although not profitable unless the clover should be estimated as worth but little more than the manure. Lot B, which was fed at the same time a closely similar ration without salt, made a very slow and unprofitable gain.

Two pens of Duroc Jerseys, each containing three sows and two barrows, were fed a similar clover and corn meal ration at

about this same time. These pigs were smaller, the average weight for Lot C being 33.1 lbs., and for Lot D, 33 lbs. The lots, composed of selected individuals of two litters, were as near alike as possible. For Lot C the clover was 86.7 per cent. of the total food and for Lot D 86.5 per cent. Lot C received .28 ounces salt per day for every hundred pounds live weight and Lot D none. As with the other lots, those having salt made the better gain, the contrast being somewhat greater than before. The meager increase without salt was at a loss, and the gain made by those pigs having salt, without considering the manure, was unprofitable even with the clover rated at less than one dollar per ton.

The results for all the periods during which any clover was fed were as follows:—

AVERAGE PER DAY FOR EACH 100 LBS. LIVE WEIGHT.

		Red clover fed.	Red clover con- sumed.	Corn meal.	Total food con- sumed.	Water.	Salt.
		Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Ounces.
Lot A.	July 18 to Aug. 8....	6.93	6.05	.70	6.75	7.80	0
" B.	Aug. 8 to Sept. 5....	7.52	5.80	.82	6.62	8.19	0
" A.	" " " ".....	7.82	5.97	.86	6.83	9.21	.25
Lot C.	Aug. 25 to Sept. 29..	9.71	7.38	1.13	8.51	6.06	.28
" D.	" " " " " 29..	10.17	7.55	1.18	8.73	5.25	0
Lot A.	Sept. 5 to Oct. 10....	3.11	1.94	2.84	4.78	8.62	0
" B.	" " " " ".....	3.02	2.23	2.70	4.93	13.72	.19

		Water- free clover con- sumed.	Water- free corn meal.	Total water- free food.	Gain in weight.	Water- free food consumed per one lb. gain.	Per cent. of total food as grain.	Percent. of water- free food as grain.
		Lbs.	Lbs.	Lbs.	Lbs.	Lbs.		
Lot A.	July 18 to Aug. 8....	2.25	.62	2.87	+.09	31.89	10.4	21.6
" B.	Aug. 8 to Sept. 5....	2.15	.73	2.88	+.07	41.14	12.4	25.3
" A.	" " " " ".....	2.22	.76	2.98	+.22	13.55	12.6	25.5
Lot C.	Aug. 25 to Sept. 29 ..	2.74	.99	3.73	+.34	10.97	13.3	26.5
" D.	" " " " "....	2.80	1.04	3.84	+.08	48.00	13.5	27.1
Lot A.	Sept. 5 to Oct. 10....	.72	2.51	3.23	+.78	4.14	59.4	77.7
" B.	" " " " ".....	.83	2.44	3.27	+.80	4.09	54.8	74.6

In the preceding table are the results from Lots A and B when fed for 35 days another ration of clover and corn meal in which clover constituted about 40 to 45 per cent. of the total food and from 22 to 25 per cent. of the water-free food. With both these pens the gain was a profitable one even with clover rated at over \$4.00 per ton, and with still a slight advantage in favor of those pigs which had a small amount of salt.

SORGHUM.

When the rations for Lots C and D, which had been largely clover, were changed to those of which sorghum constituted 89 per cent., the consumption of total food was at once greatly increased, although the amount of water-free food was practically the same. With clover the total food per day was 8.51 lbs. and 8.73 lbs. and with sorghum 13.29 and 13.75 lbs. respectively. Lot C again received salt at the rate of .24 ounces per day for every hundred pounds live weight. The results for each pen were :

AVERAGE PER DAY FOR EACH 100 LBS. LIVE WEIGHT.

		Sorghum fed.	Sorghum consumed.	Mixed grain.	Total food consumed.	Water	Salt.
		Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Ounces
Lot C.	Sept. 29 to Oct. 20	23.01	11.93	1.36	13.29	4.10	.24
" D.	" 29 " 20	26.34	12.20	1.55	13.75	3.03	.0

		Water-free sorghum consumed.	Water-free mixed grain.	Total water-free food	Gain in weight.	Water-free food consumed for 1 lb. gain.	Per cent. of total food as grain.	Per cent. of water-free food as grain.
		Lbs.	Lbs.	Lbs.	Lbs.	Lbs.		
Lot C.	Sept. 29 to Oct. 20.	2.52	1.20	3.72	+ 1.12	3.32	10.2	32.3
" D.	" 29 " 20.	2.80	1.37	4.17	+ .70	5.96	11.3	32.9

Much the better gain was made by the lot having salt, and it was a profitable one with sorghum rated at \$2.00 per ton. The gain made by the other lot although more rapid than any made with clover feed when clover constituted a large per cent. of the ration, was an unprofitable one at the fall prices, even with sorghum rated at \$1.00 per ton.

MANGOLDS.

When these same lots were fed mangolds the consumption of total food was about the same as with sorghum, the mangolds constituting 89 per cent. of the total food and about 50 per cent. of the water-free food. The pigs having salt at the rate of about .2 ounces per day per hundred pounds here gave the poorest results, and the increase in weight was barely profitable with mangolds rated so low as \$1.00 per ton. Lot D without salt made a profitable gain with mangolds estimated at \$3.00 per ton. The average results were as follows :

AVERAGE PER DAY FOR EACH 100 LBS. LIVE WEIGHT.

		Total man- golds.	Total mixed grain.	Total food.	Water.	Salt.	Water- free man- golds.
		Lbs.	Lbs.	Lbs.	Lbs.	Ounces.	Lbs.
Lot C.	Oct. 27 to Nov. 24 ¹ ...	11.15	1.40	12.55	1.66	.19	1.22
" D.	" " " "...	12.29	1.54	13.83	2.01	0	1.35

		Water- free mix- ed grain.	Total water-free food.	Gain in weight.	Water- free food for 1 lb gain in weight.	Per cent. of total food as grain.	Per cent. of water- free food as grain.
		Lbs.	Lbs.	Lbs.	Lbs.		
Lot C.	Oct. 27 to Nov. 24...	1.23	2.45	+ .51	4.80	11.2	50.2
" D.	" " " "...	1.36	2.71	+ 1.09	2.49	11.1	50.2

The mangolds were eaten without waste and no other coarse food was. The water-free food required per pound gain in weight

was less than is usually obtained from any food excepting milk. The amount of water drunk by the pigs having mangolds was, as might be expected, very small. The composition of the sorghum forage, and of the mangolds, was, for each, as follows :

	Sorghum.	Mangolds.
Water.....	77.00	88.99
Ash.....	1.13	.96
Crude albuminoids.....	2.98	1.49
Crude fibre.....	5.27	.79
N.-free extract.....	12.49	7.64
Fats.....	1.13	.14

These mangolds were inferior in composition to sugar beets, and it is probable that much better results may be obtained from beets which contain over 12 per cent. of sugar. A much larger crop of mangolds can however be grown for the same expense.

After a period of feeding grain rations, these lots of pigs were again fed mangolds with linseed meal. The Cheshires, as usual, would not take quite so much of the mangolds, the amount consumed by them being 95.7 per cent. of the total, and 73.3 per cent. of the water-free food. The Duroc Jerseys had mangolds to the extent of 97.5 per cent. of the total and 82.9 per cent. of the water-free food. The results obtained for two periods of feeding were :

AVERAGE PER DAY FOR 100 LBS. LIVE WEIGHT.

		Total mangolds con- sumed.	Total linseed meal con- sumed.	Total food con- sumed.	Oz. salt.	Water.	Water- free man- golds con- sumed.
		Lbs.	Lbs.	Lbs.		Lbs.	Lbs.
Lot A.	Feb. 13 to Mar. 20...	13.07	.59	13.66	.15	4.35	1.41
" B.	" " " " ...	13.30	.60	13.90	0	4.20	1.44
Lot C.	Feb. 2 to Mar. 2.....	16.25	.41	16.66	.12	.69	1.75
" D.	" " " "	16.16	.41	16.57	0	.92	1.74

		Water-free lin-seed meal consumed.	Total water-free food.	Gain in weight.	Water-free food consumed per 1 lb. gain.	Per cent. of total food as grain.	Per cent. of water-free food as grain.
		Lbs.	Lbs.	Lbs.	Lbs.		
Lot A.	Feb. 13 to Mar. 20...	.52	1.93	+.33	5.85	4.32	26.94
" B.	" " " " ...	.52	1.96	+.38	5.16	4.31	26.53
Lot C.	Feb. 2 to Mar. 2.....	.36	2.11	+.58	3.64	2.46	17.06
" D.	" " " " .....	.36	2.10	+.53	3.96	2.47	17.14

At the prices of pork holding at the time of this feeding, the gain made by lots C and D was profitable with linseed meal rated at \$30 per ton and mangolds at \$2 per ton, without considering the manure. The gain made by lots A and B was not profitable at these figures unless by taking into account the value of manure. The time spent in feeding is not considered in any estimates given.

While the animals of each lot were kept and fed together, the coarse foods were always offered them in excess (the waste was weighed back and moisture in it determined) so that every animal had all that was desired. The grain food was fed dry and as it required then more time for eating there was not so great opportunity for the stronger animals to get more than their share. The record of increase in weight was kept individually, the animals being designated by numbered ear tags and weighed once a week, and the individual loss or gain was always in accord with the general or average results,

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